DOCUMENT RESUME

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AUTHOR	Rushton, Erik; Ryan, Emily; Swift, Charles
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ABSTRACT

This introductory activity explores the advantages of different roof shapes for different climates or situations. It addresses questions such as "When you walk or drive around your neighborhood, what do the roofs look like?" and "What if you lived in an area with a different climate, how would that affect the style of roof that you might find?" This activity uses a time frame of 40 minutes. (Author/SOE)

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Activity: **Which Roof is Tops?**

GRADE LEVELS: pK-2

SUMMARY:

When you walk or drive around your neighborhood what do the roofs look like? What if you lived in an area with a different climate, how would that effect the style of roof that you might find. This is an introductory activity to explore the advantages of different roof shapes for different climates or situations.

LEVEL OF DIFFICULTY [1=Least Difficult: 5=Most Difficult]

1- Least Difficult

TIME REQUIRED

40 minutes (1 class period)

COST

$5-$10 per class (less than $0.50 per student)

STANDARDS:

1.3 Identify and describe the safe and proper use of tools and materials (glue, scissors, tape, ruler, paper, toothpicks, straws, spools) to construct simple structures.

2.1 Identify tools and simple machines used for a specific purpose, e.g., ramp, wheel, pulley, lever.

WHAT WILL THE STUDENTS LEARN?

Materials both natural and human-made have specific characteristics which determine how they will be used.

Engineering design requires creative thinking and consideration of a variety of ideas to solve practical problems.

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BACKGROUND INFORMATION:

A model is a copy of an object that is too big, too small, or too complicated to study easily. Engineers use models to test and study how well things are built or to test different designs. A load to an engineer is any force that pushes or pulls. For example: the weight of snow pushes down on a building, creating a snow load. A wind load pushes on the sides of a building.

RESOURCES:

http://eetd.lbl.gov/HeatIsland/CoolRoofs - Heat absorption and roof color

http://www.metalroofing.com/prods_manu.cfm - Pictures of Metal Roofs

http://www.heimer.com/information/roof.html - Pictures of Different Roofs

http://www.macroof.com/roof%20types.htm – Materials used in roofs

http://www.nsf.gov/od/lpa/events/fow/fowtfkv1n4/htm/start.htm - Good Background and Pictures

MATERIALS:

3 Shoeboxes or similar container

1 Poster Board

1 newspaper

About 2 cups of flour

A flour sifter or sieve would be a nice tool to have

PREPARATION:

Cut away one end of the box so that students can view the effects of a snow load. Use poster board to make three different types of roofs, one for each shoe box; curved, A-frame, and flat (see Roof Shapes Worksheet). Using a single piece of masking tape, tape each edge of the roof to the open top of the shoebox. Place newspaper under the testing station to catch any loose flour. You may want to place a cookie sheet under the box so that loose flour can be used in the next test. Obtain flour and containers to hold about 2 cups of flour. A flour sieve would be

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a nice tool to have available. Gather picture of different types of roof to show the class.

DIRECTIONS:

1. Show the class picture of different styles of roofs, talk with the students about what types of climates these roofs might be found in. What characteristics make a roof, ok for a given climate?
2. Show the class the example roofs that you created, explain to them that the flour will represent snow and have them make predictions as to which roof would be best for a snowy climate?
3. Slowly sprinkle "snow" onto the center of the roof. Keep watching the roof through the open end of the box.
4. Have the students make observations as the snow is applied to the roof.

Caution:

To avoid a flour storm carefully lift the roof and gently tap the bottom so that the flour falls into the shoe box. Pour the flour from the shoe box into a container to be used for the next test.

INVESTIGATING QUESTIONS:

Predict which types of roofs will cave in to snow the easiest? Why?

Does the "snow" pile up or slide off?

Which roofs sag? What does the sagging mean?

Which roofs fall down? Do they fall slowly or all at once?

In addition to snow loads, what other things should we worry about?

Which roof would you choose if you lived in a snowy area? A windy area? Rainy?

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REFERENCES:

National Science Foundation and Time or Kids "Find Out Why?". [Online] July 16, 2001. http://www.nsf.gov/od/lpa/events/fow/fowtfkv1n4/htm/start.htm

Rubric for Performance Assessment						
Activity Title:	Which Roof is Tops					
	1	2	3	4		
Criteria	Beginning	Developing	Proficient	Advanced	Weight (X factor)	Subtotal
TESTING OF KNOWLEDGE AND CONCEPTS	Student show no understanding of concepts covered	Student show some understanding of concepts covered	Student demonstrates a good understanding of concepts covered	Student demonstrates a good understanding of concepts covered and is able to make conections to the world around them		
					Total:	
Teacher Comments:						

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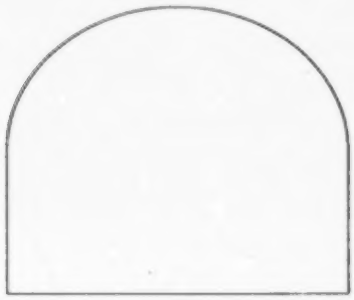
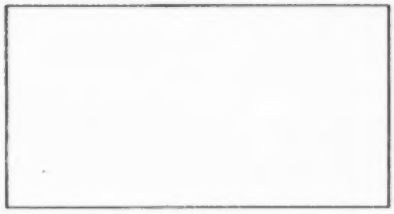
WHICH ROOF IS TOPS
ROOF SHAPE WORKSHEET



Curved Roof

A-Frame Roof



Flat Roof

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PreK-12
ENGINEERING

Activity Evaluation Form www.k12engineering.org

Activity Name: _____

Grade Level the Activity was implemented at: _____

Was this Activity effective at this grade level (if so, why, and if not, why not)?

What were the Activity's strong points?

What were its weak points?

Was the suggested Time Required sufficient (if not, which aspects of the Activity took shorter or longer than expected)?

Was the supposed Cost accurate (if not, what were some factors that contributed to either lower or higher costs)?

Do you think that the Activity sufficiently represented the listed MA Framework Standards (if not, do you have suggestions that might improve the Activity's relevance)?

Was the suggested Preparation sufficient in raising the students' initial familiarity with the Activity's topic (if not, do you have suggestions of steps that might be added here)?

If there were any attached Rubrics or Worksheets, were they effective (if not, do you have suggestions for their improvement)?

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I. DOCUMENT IDENTIFICATION:

Title: PreK-12 Engineering Activities

1) Touch and Discover, Grades PreK-2
http://www.prek-12engineering.org/data/d2/Touchdiscover.pdf

2) Invent a Backscratcher from Everyday Materials, Grades PreK-2
http://www.prek-12engineering.org/data/d28/Backscratcher.pdf

3) Compare Human-Made Objects with Natural Objects, Grades PreK-5
http://www.prek-12engineering.org/data/d34/HumanvsNatural.pdf

4) Do Different Colors Absorb Heat Better?, Grades PreK-2
http://www.prek-12engineering.org/data/d37/Absorbheat.pdf

5) Which Roof is Tops?, Grades PreK-2
http://www.prek-12engineering.org/data/d44/RoofTops.pdf

6) Make Your Own Recycled Paper, Grades PreK-2
http://www.prek-12engineering.org/data/d56/Recycle.pdf

7) Build an Approximate Scale Model of an Object Using LEGOs, Grades 3-5
http://www.prek-12engineering.org/data/d3/LegoScaleModel.pdf

8) Design Weather Instruments using Lego Sensors, Grades 3-5
http://www.prek-12engineering.org/data/d4/LegoWeather.pdf

9) Space Shelter, Grades 3-5
http://www.prek-12engineering.org/data/d5/SpaceShelter.pdf

10) Build a Bird House, Grades 3-5
http://www.prek-12engineering.org/data/d6/BirdHouse.pdf

11) Ball Bounce Experiment, Grades 3-5
http://www.prek-12engineering.org/data/d6/BallBounce.pdf

12) Make an Alarm!, Grades 3-5
http://www.prek-12engineering.org/data/d11/MakeAlarm.pdf

13) Design Packing to Safely Mail Raw Spaghetti, Grades 3-5
http://www.prek-12engineering.org/data/d17/MailSpaghetti.pdf

14) Disassemble a Click Pen, Grades 3-5
http://www.prek-12engineering.org/data/d33/clickPen.pdf

15) Construct And Test Roofs for Different Climates, Grades 3-5
http://www.prek-12engineering.org/data/d35/ClimateRoof.pdf

16) Compare Fabric Materials, Grades 3-5
http://www.prek-12engineering.org/data/d36/Fabric.pdf

17) A House is a House for Me, Grades 3-5
http://www.prek-12engineering.org/data/d52/House.pdf

18) Water Filtration, Grades 3-5
http://www.prek-12engineering.org/data/d53/Water Filtration.pdf

19) What is the Best Insulator: Air, Styrofoam, Foil, or Cotton?, Grades 3-5
http://www.prek-12engineering.org/data/d54/BestInsulator.pdf

20) Design a Recycling Game!, Grades 3-5
http://www.prek-12engineering.org/data/d55/Recycling.pdf

21) Tower Investigation and the Egg, Grades 6-8
http://www.prek-12engineering.org/data/d7/TowerEgg.pdf

22) Wimpy Radar Antenna!, Grades 6-8
http://www.prek-12engineering.org/data/d10/WimpyAntenna.pdf

23) Portable Sundial, Grades 6-8
http://www.prek-12engineering.org/data/d30/PortableSundial.pdf

24) An Introduction To Loads Acting on Structures, Grades 6-8
http://www.prek-12engineering.org/data/d31/IntroLoads.pdf

25) Design Your Own Rube Goldberg Machine, Grades 6-8
http://www.prek-12engineering.org/data/d32/RubeGoldberg.pdf

26) Building Tetrahedral Kites, Grades 6-8
http://www.prek-12engineering.org/data/d38/tetrakites.pdf

27) Do as the Romans: Construct an Aqueduct!, Grades 6-8
http://www.prek-12engineering.org/data/d39/Aqueduct.pdf

28) Build an Earthquake City!!, Grades 6-8
http://www.prek-12engineering.org/data/d40/EarthquakeCity.pdf

29) Design a Parachute, Grades 6-8
http://www.prek-12engineering.org/data/d41/Parachute.pdf

30) The Squeeze is On, Grades 6-8
http://www.prek-12engineering.org/data/d42/Squeeze.pdf

31) Stop The Stretching, Grades 6-8
http://www.prek-12engineering.org/data/d43/StopStretching.pdf

32) Speaker Project, Grades 9-10
http://www.prek-12engineering.org/data/d13/Speaker.pdf

Author(s): Erik Rushton, Emily Ryan, Charles Swift

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Signature: Margaret Newell

Printed Name/Position/Title: Margaret Newell, Associate Provost for Research

Organization/Address: Tufts University
126 Harrison Avenue, Suite 75K-401
Boston, MA 02111

Telephone: 617-636-6550
Fax: 617-636-2917
E-mail Address: peter.wong@tufts.edu

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